

NEW

Network Function Integrated Type Laser Displacement Sensor

HL-G2 SERIES

Specifications



Network Function Integrated Type Laser Displacement Sensor

HL-G2 SERIES

High-precision Displacement Sensors Made Easier to Use



Features

• **Industry's top-class^{*1} measuring performance to ensure high-precision measurement**

Resolution^{*2}: 0.5 μm **0.020 mil**, Linearity^{*2}: $\pm 0.05\%$ F.S.,
 High-speed sampling period: Max. 100 μs ,
 Temperature characteristic: 0.03 % F.S./ $^{\circ}\text{C}$,
 Measuring range^{*2}: 25 to 400 mm **0.984 to 15.748 in**

^{*1} According to our company's survey, as of February 2024.

^{*2} Specifications vary depending on models.

• **Integrated models with built-in controllers and communication units for easy use**

Supported protocols: EtherNet/IP, SLMP, Modbus TCP, Modbus RTU

• **Configuration tool software offering simple and intuitive operation**

HL-G2 Configuration Tool





Conforming to
FDA regulations



ORDER GUIDE

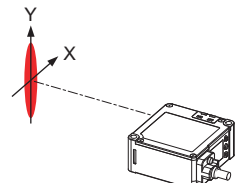
Cables are not supplied with sensor units. Be sure to purchase optional cables.

Type	Appearance	Measurement center distance and measurement range	Beam diameter (Note 2, 3)	Resolution	Linearity Limited range (top) Other (bottom)	Model No.
Communication type		30 mm ± 5 mm 1.181 in ± 0.197 in	X-axis: 40 μm 1.575 mil approx. Y-axis: 1,000 μm 39.370 mil approx.	0.5 μm 0.020 mil	$\pm 0.05\%$ F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in) $\pm 0.075\%$ F.S.	HL-G203B-S-MK
		50 mm ± 10 mm 1.969 in ± 0.394 in	X-axis: 60 μm 2.362 mil approx. Y-axis: 2,000 μm 78.740 mil approx.	1.5 μm 0.059 mil	$\pm 0.05\%$ F.S. (45 mm to 55 mm) (1.772 in to 2.165 in) $\pm 0.075\%$ F.S.	HL-G205B-S-MK
		85 mm ± 20 mm 3.346 in ± 0.787 in	X-axis: 90 μm 3.543 mil approx. Y-axis: 3,000 μm 118.110 mil approx.	2.5 μm 0.098 mil	$\pm 0.05\%$ F.S. (75 mm to 95 mm) (2.953 in to 3.740 in) $\pm 0.075\%$ F.S.	HL-G208B-S-MK
		120 mm ± 30 mm 4.724 in ± 1.181 in	X-axis: 100 μm 3.937 mil approx. Y-axis: 4,000 μm 157.480 mil approx.	4 μm 0.157 mil	$\pm 0.05\%$ F.S. (105 mm to 135 mm) (4.134 in to 5.315 in) $\pm 0.075\%$ F.S.	HL-G212B-S-MK
		250 mm ± 150 mm 9.843 in ± 5.906 in	X-axis: 300 μm 11.811 mil approx. Y-axis: 8,000 μm 314.961 mil approx.	15 μm 0.591 mil	$\pm 0.15\%$ F.S. (200 mm to 300 mm) (7.874 in to 11.811 in) $\pm 0.25\%$ F.S.	HL-G225B-S-MK
Analog output type		30 mm ± 5 mm 1.181 in ± 0.197 in	X-axis: 40 μm 1.575 mil approx. Y-axis: 1,000 μm 39.370 mil approx.	0.5 μm 0.020 mil	$\pm 0.05\%$ F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in) $\pm 0.075\%$ F.S.	HL-G203B-A-MK
		50 mm ± 10 mm 1.969 in ± 0.394 in	X-axis: 60 μm 2.362 mil approx. Y-axis: 2,000 μm 78.740 mil approx.	1.5 μm 0.059 mil	$\pm 0.05\%$ F.S. (45 mm to 55 mm) (1.772 in to 2.165 in) $\pm 0.075\%$ F.S.	HL-G205B-A-MK
		85 mm ± 20 mm 3.346 in ± 0.787 in	X-axis: 90 μm 3.543 mil approx. Y-axis: 3,000 μm 118.110 mil approx.	2.5 μm 0.098 mil	$\pm 0.05\%$ F.S. (75 mm to 95 mm) (2.953 in to 3.740 in) $\pm 0.075\%$ F.S.	HL-G208B-A-MK
		120 mm ± 30 mm 4.724 in ± 1.181 in	X-axis: 100 μm 3.937 mil approx. Y-axis: 4,000 μm 157.480 mil approx.	4 μm 0.157 mil	$\pm 0.05\%$ F.S. (105 mm to 135 mm) (4.134 in to 5.315 in) $\pm 0.075\%$ F.S.	HL-G212B-A-MK
		250 mm ± 150 mm 9.843 in ± 5.906 in	X-axis: 300 μm 11.811 mil approx. Y-axis: 8,000 μm 314.961 mil approx.	15 μm 0.591 mil	$\pm 0.15\%$ F.S. (200 mm to 300 mm) (7.874 in to 11.811 in) $\pm 0.25\%$ F.S.	HL-G225B-A-MK

Notes: 1) Unless otherwise specified, the above specifications are typical values measured under the following measurement conditions. They do not guarantee performance for all target objects.
 Power supply voltage: 24 V DC, ambient temperature: 20 $^{\circ}\text{C}$ 68 $^{\circ}\text{F}$, sampling cycle: 1 ms, average count: 512 times, measurement center distance, target object: visible light shielding ceramic


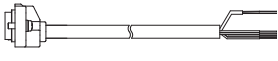
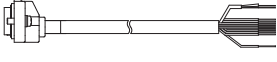
2) The X and Y axes of the beam diameter are specified as shown in the figure on the right.

3) The beam diameter is defined as $1/e^2$ (approx. 13.5 %) of the center light intensity. Due to leak light outside the defined range, the measurement values may be affected if the reflectance around the detecting point is higher than that of the detecting point.



OPTIONS

Cables are not supplied with sensor units. Be sure to purchase optional cables.

Type		Appearance	Model No.	Description		
Optional cable	Ethernet type		CN-8E-C2	Length 2 m 6.562 ft	Used with communication type sensor HL-G2□B-S-MK . Two M2.6 screws provided.	
			CN-8E-C5	Length 5 m 16.404 ft		
	RS-485 type		CN-8R-C2	Length 2 m 6.562 ft		
			CN-8R-C5	Length 5 m 16.404 ft		
			CN-8R-C10	Length 10 m 32.808 ft		
			CN-8R-C20	Length 20 m 65.617 ft		
	Analog output type		CN-8A-C2	Length 2 m 6.562 ft		Used with analog output type sensor HL-G2□B-A-MK . Two M2.6 screws provided.
			CN-8A-C5	Length 5 m 16.404 ft		

Operating Environment for Configuration Tool Software HL-G2 Configuration Tool

The following operating environment must be assured in order to use the configuration tool software **HL-G2 Configuration Tool**. Confirm that your system satisfies the requirements and that the required devices have been arranged.

Item	Requirements
OS	Windows® 10 (32 bit / 64 bit), Windows® 11 (64 bit)
CPU	Intel® Core™ i3 1 GHz or faster
Memory	2 GB or more
Available hard disk space	200 MB or more
Screen resolution	1366 × 768 or higher (recommended)
Display language	Japanese, English, Chinese (Simplified), Korean
Communication interface	Ethernet, RS-485
Operating conditions	.NET Frameworks 4.8 or later must be installed.

Note: Compatibility not guaranteed if the OS version used is no longer supported by Microsoft Corporation.

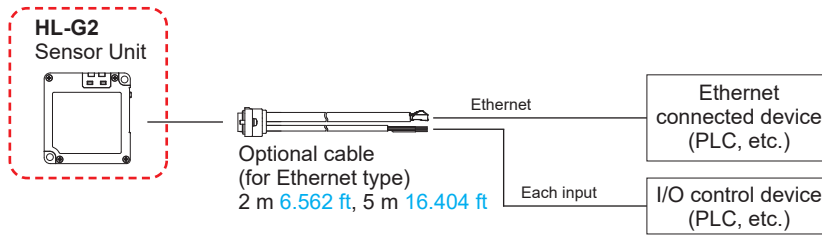
* Windows is a trademark or registered trademark of Microsoft Corporation in the United States and/or other countries.

* Intel Core is a trademark or registered trademark of Intel Corporation and its subsidiaries in the United States and/or other countries.

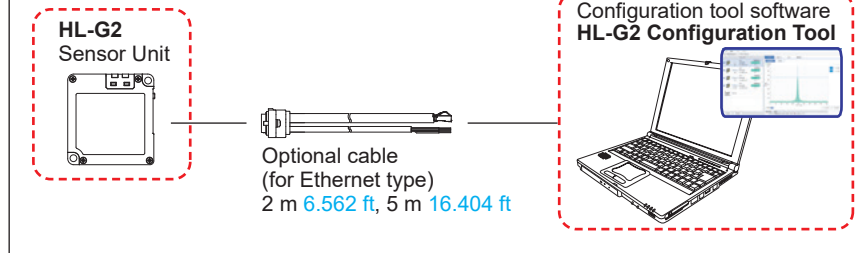
EXAMPLE OF SYSTEM CONFIGURATION

Communication type

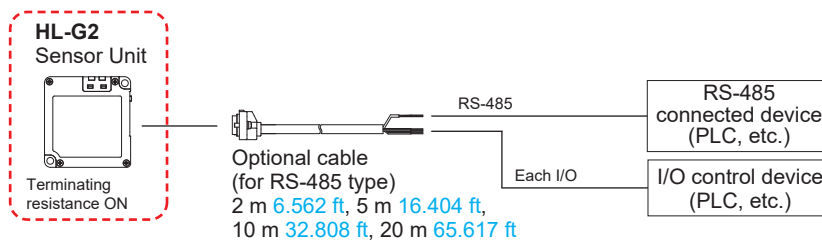
Ethernet communication



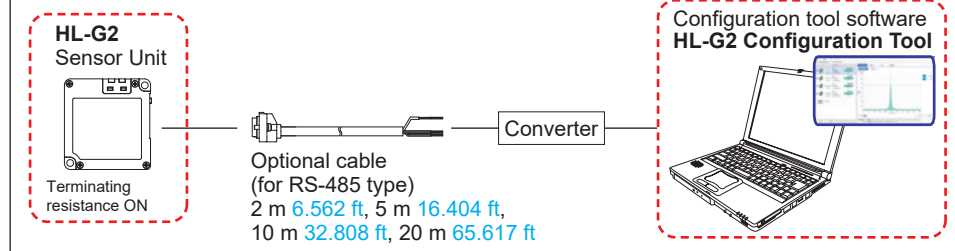
Example of system configuration for use of PC installed with configuration tool software



RS-485 communication

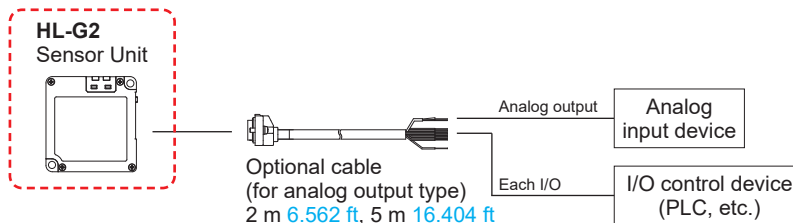


Example of system configuration for use of PC installed with configuration tool software



- RS-485 wiring allows connection of up to 16 devices.
- When RS-485 wiring is used for the converter, be sure to check for proper operation using actual equipment before using.

Analog output type

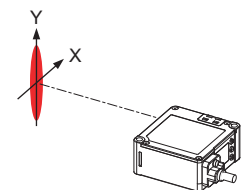


SPECIFICATIONS

Communication type

Type		Communication type				
Item	Model No.	HL-G203B-S-MK	HL-G205B-S-MK	HL-G208B-S-MK	HL-G212B-S-MK	HL-G225B-S-MK
Applicable regulations and certifications		CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations), FDA Regulation, TÜV SÜD Certification (U.S.A., Canada), Korea KC Mark				
Measurement center distance		30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in	250 mm 9.843 in
Measurement range		±5 mm ±0.197 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±30 mm ±1.181 in	±150 mm ±5.906 in
Beam diameter (Note 2)(Note 3)		X-axis: 40 μm 1.575 mil approx. Y-axis: 1,000 μm 39.370 mil approx.	X-axis: 60 μm 2.362 mil approx. Y-axis: 2,000 μm 78.740 mil approx.	X-axis: 90 μm 3.543 mil approx. Y-axis: 3,000 μm 118.110 mil approx.	X-axis: 100 μm 3.937 mil approx. Y-axis: 4,000 μm 157.480 mil approx.	X-axis: 300 μm 11.811 mil approx. Y-axis: 8,000 μm 314.961 mil approx.
Resolution		0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil	4 μm 0.157 mil	15 μm 0.591 mil
Linearity	Limited range	±0.05 % F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in)	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in)	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in)	±0.05 % F.S. (105 mm to 135 mm) (4.134 in to 5.315 in)	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in)
	Other than above	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.25 % F.S.
Temperature characteristics		0.03 % F.S./°C				
Measuring method		Diffuse reflection				
Light source		Red semiconductor laser: Class 2 [IEC / EN / JIS / GB / KS / FDA Laser Notice No. 56 (Note 4)] Maximum output: 1 mW, Peak emission wavelength: 655 nm				
Light receiving element		CMOS image sensor				
Power supply voltage		Power supply units with a current capacity of 500 mA or more, including 24 V DC ±10 %, ripple 0.5 V (P-P)				
Current consumption		150 mA or less (Note 5)				
Sampling cycle		100 μs, 200 μs, 500 μs, 1 ms, 2 ms				
Communication interface	Ethernet	<ul style="list-style-type: none"> • Only Auto Negotiation 10 M / 100 Mbps (Half Duplex / Full Duplex) supported. Communication may be unstable if connected to a device that does not support Auto Negotiation. • IEEE802.3u, 10BASE-T / 100BASE-TX RJ45 • Supported protocol: EtherNet/IP, Modbus TCP, and SLMP 				
	RS-485	<ul style="list-style-type: none"> • Communication speed: 9,600 / 19,200 / 38,400 / 115,200 / 230,400 bps • Supported protocol: Modbus RTU • Maximum number of connected units: 16 				
External input	IN 1	<ul style="list-style-type: none"> • Trigger input • The input conditions are interlocked with NPN / PNP setting of the control output <When NPN output is selected> <ul style="list-style-type: none"> • Source current: 1.5 mA approx. • Input conditions <ul style="list-style-type: none"> Invalid: 3 to 26.4 V DC or when released Valid: 0 to 1.5 V DC <When PNP output is selected> <ul style="list-style-type: none"> • Sink current: 2.5 mA approx. • Input conditions <ul style="list-style-type: none"> Invalid: 0 to 11 V DC or when released Valid: 19 to 26.4 V DC 				
Indicators	Laser radiation	Green LED (Lit while laser beams are being emitted)				
	Alarm	Orange LED (Lit when measurement is not possible due to insufficient or excessive received light intensity, or due to excessive extraneous light)				
Display section		0.9 inch organic EL Measured value: signed 5-digit (maximum of 4 digits after the decimal point)				
Pollution degree		2				
Operating altitude(Note 6)		2,000 m 6561.680 ft or less				
Grounding method		Capacitor grounding				
Environmental resistance	Protection	IP67 (IEC)				
	Ambient temperature	-10 to +45 °C -14 to 113 °F (No icing allowed), Storage: -20 to +60 °C -4 to 140 °F (No icing allowed)				
	Ambient humidity	35 to 85 % RH (No condensation allowed), Storage: 35 to 85 % RH (No condensation allowed)				
	Ambient illuminance	Incandescent light: 3,000 lx or less at the light-receiving face				
	Insulation resistance	20 MΩ or higher, using 500 V DC megger				
	Withstand voltage	1,000 V AC between all terminals and case for 1 minute				
	Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in double amplitude in X, Y and Z directions for two hours each				
Shock resistance	500 m/s ² acceleration (50 G approx.) in X, Y and Z directions three times each					
Material		Product casing: Aluminum die casting, Front cover: Glass, Cable: PVC				
Weight		Net weight: 150 g approx., Gross weight: 200 g approx.				

- Notes: 1) Unless otherwise specified, the above specifications are typical values measured under the following measurement conditions. They do not guarantee performance for all target objects.
Power supply voltage: 24 V DC, ambient temperature: 20 °C **68 °F**, sampling cycle: 1 ms, average count: 512 times, measurement center distance, target object: visible light shielding ceramic
- 2) The X and Y axes of the beam diameter are specified as shown in the figure on the right.
- 3) The beam diameter is defined as 1/e² (approx. 13.5 %) of the center light intensity.
Due to leak light outside the defined range, the measurement values may be affected if the reflectance around the detecting point is higher than that of the detecting point.
- 4) This product complies with the FDA regulations (FDA 21 CFR 1040.10 and 1040.11) in accordance with FDA Laser Notice No. 56, except for complying with IEC 60825-1 Ed. 3.
- 5) Current consumption of the sensor only. External input current is not included.
- 6) Do not use or store this product in environments where ambient air is pressurized to an air pressure higher than the atmospheric pressure at an altitude of 0 m.



* Ethernet is a registered trademark of FUJIFILM Business Innovation Corp.
* EtherNet/IP is a trademark or a registered trademark of Open DeviceNet Vendors Association (ODVA).
* Modbus is a registered trademark of Schneider Electric USA Inc.
* SLMP is a registered trademark of Mitsubishi Electric Corporation.

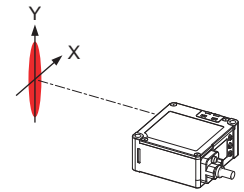
SPECIFICATIONS

Analog output type

Type		Analog output type				
Item	Model No.	HL-G203B-A-MK	HL-G205B-A-MK	HL-G208B-A-MK	HL-G212B-A-MK	HL-G225B-A-MK
Applicable regulations and certifications		CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations), FDA Regulation, TÜV SÜD Certification (U.S.A., Canada), Korea KC Marking				
Measurement center distance		30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in	250 mm 9.843 in
Measurement range		±5 mm ±0.197 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±30 mm ±13.78 in	±150 mm ±5.906 in
Beam Diameter (Note 2)(Note 3)		X-axis: 40 μm 1.575 mil approx.	X-axis: 60 μm 2.362 mil approx.	X-axis: 90 μm 3.543 mil approx.	X-axis: 100 μm 3.937 mil approx.	X-axis: 300 μm 11.811 mil approx.
		Y-axis: 1,000 μm 39.370 mil approx.	Y-axis: 2,000 μm 78.740 mil approx.	Y-axis: 3,000 μm 118.110 mil approx.	Y-axis: 4,000 μm 157.480 mil approx.	Y-axis: 8,000 μm 314.961 mil approx.
Resolution		0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil	4 μm 0.157 mil	15 μm 0.591 mil
Linearity		Limited range (27.5 mm to 32.5 mm) (1.083 in to 1.280 in)	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in)	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in)	±0.05 % F.S. (105 mm to 135 mm) (4.134 in to 5.315 in)	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in)
		Other than above	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.
Temperature characteristics		0.03 %F.S./°C				
Measuring method		Diffuse reflection				
Light source		Red semiconductor laser: Class 2 [IEC / EN / JIS / GB / KS / FDA Laser Notice No. 56 (Note 4)] Maximum output: 1 mW, Peak emission wavelength: 655 nm				
Light receiving element		CMOS image sensor				
Power supply voltage		Power supply units with a current capacity of 500 mA or more, including 24 V DC ±10 %, ripple 0.5 V (P-P)				
Current consumption		150 mA or less (Note 5)				
Sampling cycle		100 μs, 200 μs, 500 μs, 1 ms, 2 ms				
Analog output		Output mode switchable by changing the setting				
			When voltage output is selected		When current output is selected	
		Output scale (Default value)	0 V to 5 V / F.S.		4 mA to 20 mA / F.S.	
		Normal output range	0 V to 5.25 V		3.2 mA to 20.8 mA	
		Alarm *1	5.3 V ± 20 mV		22 mA ± 100 μA	
		Indeterminate state	5.5 V ± 20 mV		23 mA ± 100 μA	
		Impedance	Output impedance: 100 Ω		Load impedance: 300 Ω or less	
		Resolution *2	± 2 mV		± 6 μA	
		Linearity *3	±0.05 % F.S.		±0.25 % F.S.	
		Temperature characteristics	0.005 % F.S./°C		0.01 % F.S./°C	
		*1: The value that will be output when Alarm analog output is set to Alarm. When set to Hold, the value immediately before alarm occurrence will be held.				
		*2: This refers to the repeatability of analog output only. Static resolution and linearity error by measurement will be added.				
		*3: This refers to the linearity of analog output only. Static resolution and linearity error by measurement will be added. This does not include the repeatability of analog output only.				
Control output		OUT 1 OUT 2 OUT 3	<ul style="list-style-type: none"> Possible to switch over between NPN transistor open collector / PNP transistor open collector by changing the setting Possible to switch over between judgment output and alarm output by changing the setting 			
		Output type	Possible to switch over between open and close when set to ON by changing the setting			
		Protection	Equipped (Automatic recovery type) * This is not an overcurrent protection.			
External input		IN 1 IN 2 IN 3	<ul style="list-style-type: none"> Possible to switch over from trigger, zero setting, measured value resetting, laser stop, teaching, or bank by changing the setting The input conditions are interlocked with NPN / PNP setting of the control output 			
			<When NPN output is selected>		<When PNP output is selected>	
			<ul style="list-style-type: none"> Source current: 1.5 mA approx. Input conditions Invalid: 3 to 26.4 V DC or open Valid: 0 to 1.5 V DC 		<ul style="list-style-type: none"> Sink current: 2.5 mA approx. Input conditions Invalid: 0 to 11 V DC or open Valid: 19 to 26.4 V DC 	
Indicators		Laser radiation	Green LED (Lit while laser beams are being emitted)			
		Alarm	Orange LED (Lit when measurement is not possible due to insufficient or excessive received light intensity, or due to excessive extraneous light)			
Display section		0.9 inch organic EL Measured value: signed 5-digit (maximum of 4 digits after the decimal point)				
Pollution degree		2				
Operating altitude(Note 6)		2,000 m 6561.680 ft or less				
Grounding method		Capacitor grounding				
Environmental resistance		Protection	IP67 (IEC)			
		Ambient temperature	-10 to +45 °C -14 to 113 °F (No icing allowed), Storage: -20 to +60 °C -4 to 140 °F (No icing allowed)			
		Ambient humidity	35 to 85 % RH (No condensation allowed), Storage: 35 to 85 % RH (No condensation allowed)			
		Ambient illuminance	Incandescent light: 3,000 lx or less at the light-receiving face			
		Insulation resistance	20 MΩ or higher, using 500 V DC megger			
		Withstand voltage	1,000 V AC between all terminals and case for 1 minute			
		Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in double amplitude in X, Y and Z directions for two hours each			
		Shock resistance	500 m/s ² acceleration (50 G approx.) in X, Y and Z directions three times each			
Material		Product casing: Aluminum die casting, Front cover: Glass, Cable: PVC				
Weight		Net weight: 150 g approx., Gross weight: 200 g approx.				

SPECIFICATIONS

- Notes: 1) Unless otherwise specified, the above specifications are typical values measured under the following measurement conditions. They do not guarantee performance for all target objects.
 Power supply voltage: 24 V DC, ambient temperature: 20 °C 68 °F, sampling cycle: 1 ms, average count: 512 times, measurement center distance, target object: visible light shielding ceramic
- The X and Y axes of the beam diameter are specified as shown in the figure on the right.
 - The beam diameter is defined as $1/e^2$ (approx. 13.5 %) of the center light intensity.
 Due to leak light outside the defined range, the measurement values may be affected if the reflectance around the detecting point is higher than that of the detecting point.
 - This product complies with the FDA regulations (FDA 21 CFR 1040.10 and 1040.11) in accordance with FDA Laser Notice No. 56, except for complying with IEC 60825-1 Ed. 3.
 - Current consumption of the sensor only. External input current is not included.
 - Do not use or store this product in environments where ambient air is pressurized to an air pressure higher than the atmospheric pressure at an altitude of 0 m.



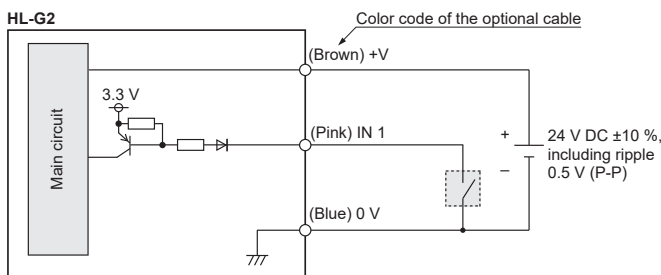
I/O CIRCUIT AND WIRING DIAGRAMS

Refer to the instruction manual for details. The instruction manual can be downloaded from our website.

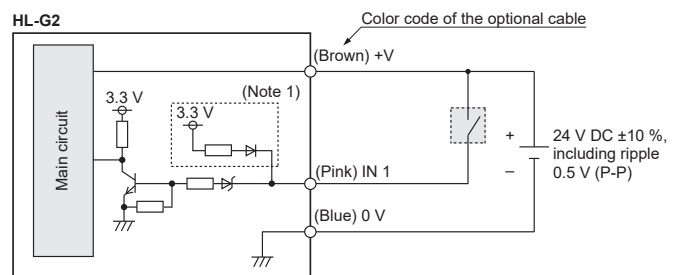
Communication type

I/O circuit diagram

When NPN output is selected

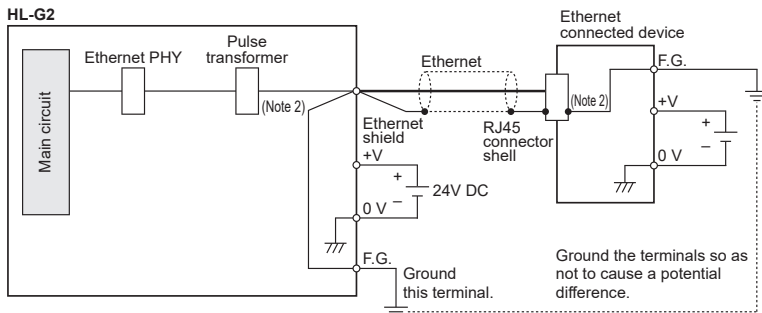


When PNP output is selected



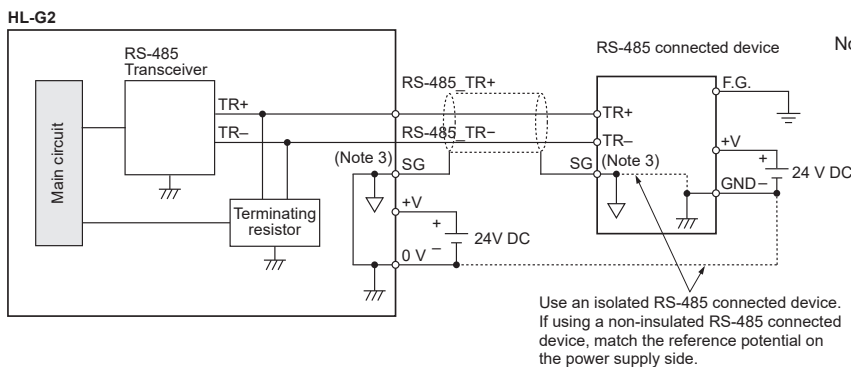
Notes: 1) This product operates as a normal PNP input sensor according to the PNP input specifications. However, due to the effect of the NPN / PNP switching circuit, 3.3 V is applied from the input to the outside when PNP is set. Therefore, if the input is shorted to 0 V in the PNP setting, a current of approximately 1 mA will flow to the outside. Although this does not cause the product to fail, note that it allows a current to flow to the connected device.

Ethernet circuit diagram



Notes: 2) The F.G. terminal and Ethernet shield of this product and the RJ45 connector shell are internally connected. If there is a potential difference between the F.G. of this product and the F.G. of the Ethernet connected device, an overcurrent may flow between the F.G. terminals of each other, causing a failure. Ground this product so as not to cause a potential difference between the F.G. of the product and the F.G. of the Ethernet-connected device. Also note that, if signal lines other than the ground line are incorrectly wired to the F.G., an overcurrent may flow, causing a failure.

RS-485 circuit diagram

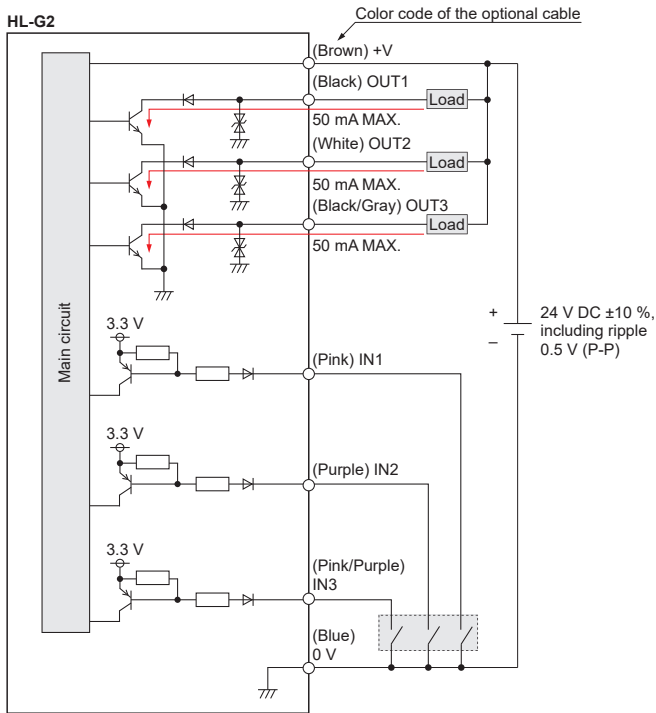


Notes: 3) The 0 V and SG terminals of this product are internally connected. If there is a potential difference between the sensor unit power supply (0 V) and the GND of the RS-485 connected device power supply, an overcurrent may flow between the 0 V and SG terminals, causing a failure. To avoid this, use an insulated RS-485 connected device or match the potential of the sensor unit power supply (0 V) with that of the GND of the RS-485 connected device power supply. Note also that, if signals with a potential difference are incorrectly wired between the 0 V and SG terminals, an overcurrent may flow, causing a failure.

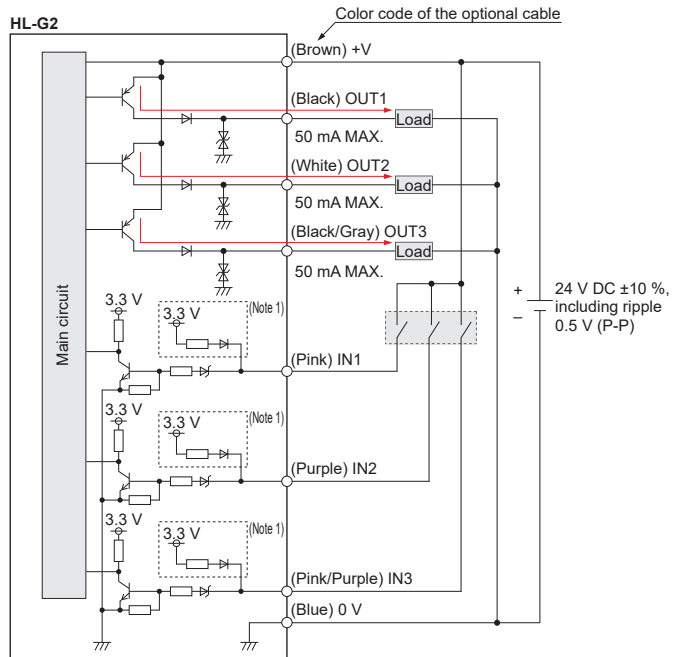
Analog output type

I/O circuit diagram

When NPN output is selected

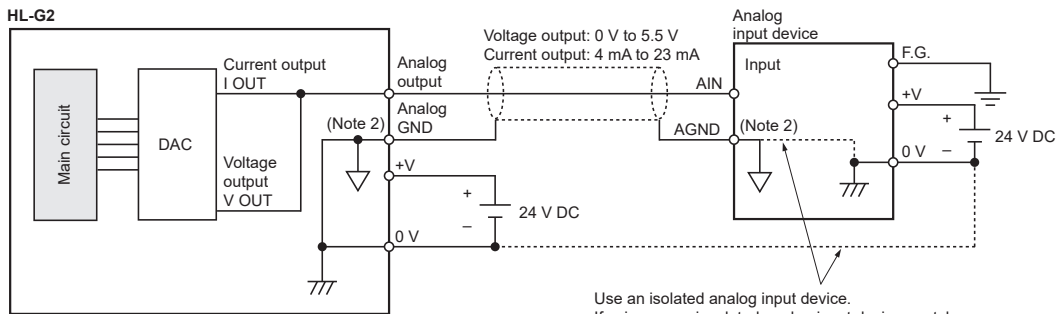


When PNP output is selected



Notes: 1) This product operates as a normal PNP input sensor according to the PNP input specifications. However, due to the effect of the NPN / PNP switching circuit, 3.3 V is applied from the input to the outside when PNP is set. Therefore, if the input is shorted to 0 V in the PNP setting, a current of approximately 1 mA will flow to the outside. Although this does not cause the product to fail, note that it allows a current to flow to the connected device.

Analog output circuit



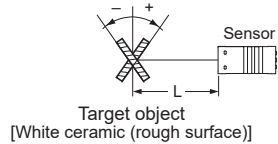
Use an isolated analog input device.
If using a non-insulated analog input device, match the reference potential on the power supply side.

Notes: 2) The 0 V and analog GND terminals of this product are internally connected. If there is a potential difference between the sensor unit power supply (0 V) and the GND of the analog input device power supply, an overcurrent may flow between the 0 V and the AGND, causing a failure. To avoid this, use an insulated analog input device or match the potential of the sensor unit power supply (0 V) with that of the GND of the analog input device power supply. Note also that, if signals with a potential difference are incorrectly wired between the 0 V and the analog GND, an overcurrent may flow, causing a failure.

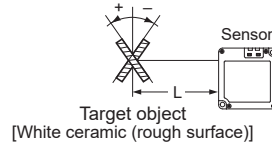
SENSING CHARACTERISTICS (TYPICAL)

Correlation between measuring distance and error characteristics

• Vertical placement



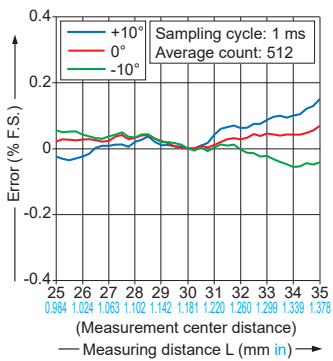
• Horizontal placement



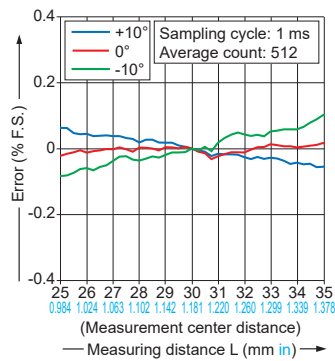
HL-G203B-S-MK

Communication type

• Vertical placement



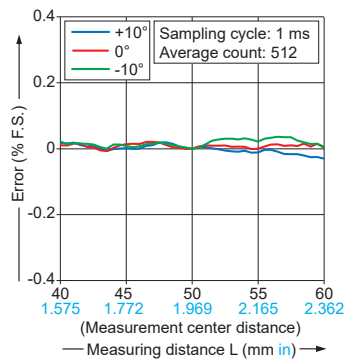
• Horizontal placement



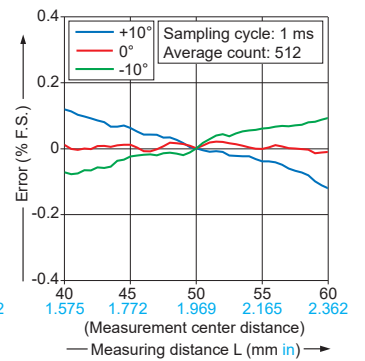
HL-G205B-S-MK

Communication type

• Vertical placement



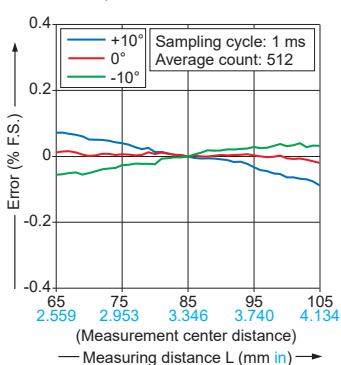
• Horizontal placement



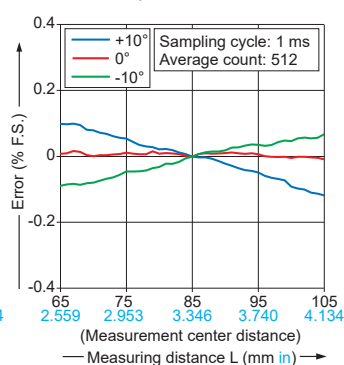
HL-G208B-S-MK

Communication type

• Vertical placement



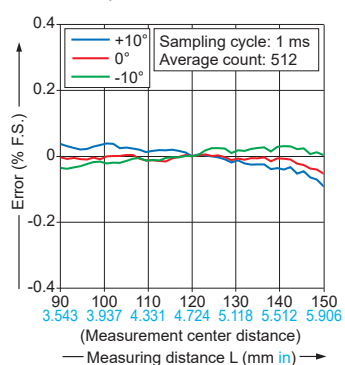
• Horizontal placement



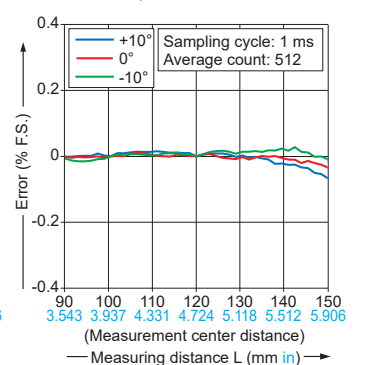
HL-G212B-S-MK

Communication type

• Vertical placement



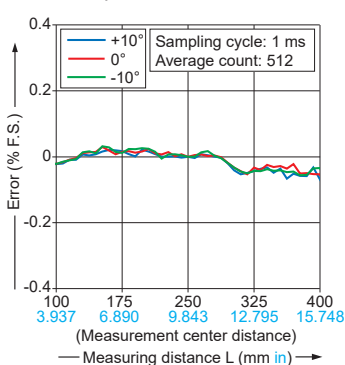
• Horizontal placement



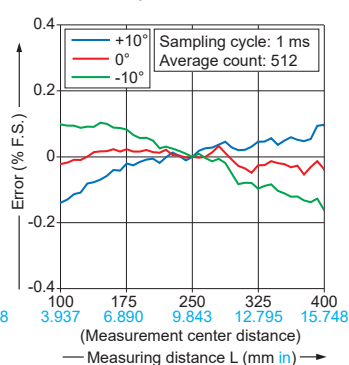
HL-G225B-S-MK

Communication type

• Vertical placement



• Horizontal placement



• This catalog is a guide to select a suitable product. Be sure to read instruction manual attached to the product prior to its use.



- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.



- Hazardous exposure to laser radiation may result if control or adjustment operations are performed based on procedures not specified in the product instruction manual or User's Manual.



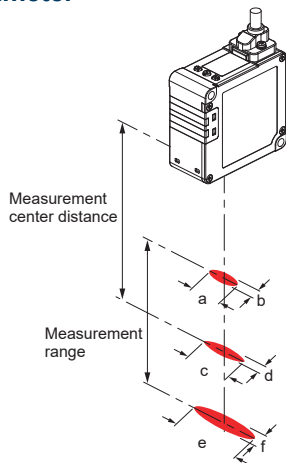
- This product is classified as a Class 2 Laser Product under IEC / EN / JIS / GB / KS standards and FDA * regulations. Do not look at the laser beam directly or through an optical system such as a lens.
- Based on the safety standards for laser products, FDA / IEC (EN) standard certification / identification / warning labels are affixed to both sides of this product.



- This product is shipped with JIS, GB, and KS standard warning labels. Affix appropriate labels over the FDA / IEC (EN) labels as needed.

*: This product complies with the FDA regulations (FDA 21 CFR 1040.10 and 1040.11) in accordance with FDA Laser Notice No. 56, except for complying with IEC 60825-1 Ed. 3. (Class 2 laser products)

Beam diameter

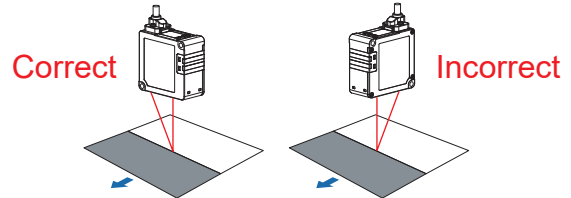


Model No.	Beam diameter (Unit: mm in)					
	a	b	c	d	e	f
HL-G203B-S-MK	0.7	0.1	1.0	0.04	1.3	0.1
HL-G203B-A-MK	0.028	0.004	0.039	0.002	0.051	0.004
HL-G205B-S-MK	1.2	0.2	2.0	0.06	2.8	0.2
HL-G205B-A-MK	0.047	0.008	0.079	0.002	0.110	0.008
HL-G208B-S-MK	2.0	0.3	3.0	0.09	4.0	0.2
HL-G208B-A-MK	0.079	0.012	0.118	0.004	0.157	0.008
HL-G212B-S-MK	2.8	0.3	4.0	0.1	5.2	0.3
HL-G212B-A-MK	0.110	0.012	0.157	0.004	0.205	0.012
HL-G225B-S-MK	2.5	0.7	8.0	0.3	13.5	0.5
HL-G225B-A-MK	0.098	0.028	0.315	0.012	0.531	0.020

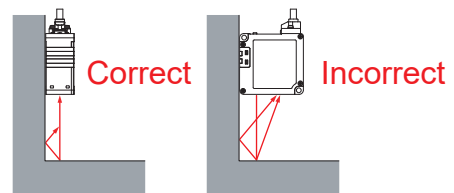
Installation direction

- To stabilize measurement (including the reduction of measurement errors), install the sensor considering the installation direction depending on the operating environment. Install the sensor so that the beam emitting part and beam receiving part surfaces are set in parallel with the measurement object.

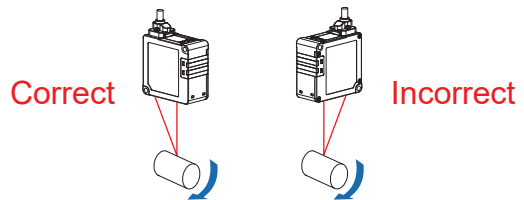
When the material or color of the measurement object largely varies



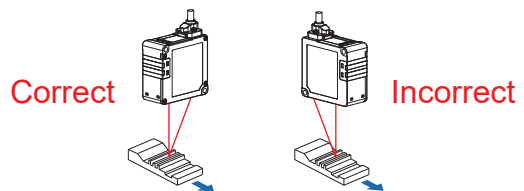
When installing the sensor head on a wall surface



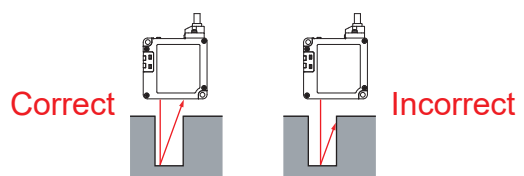
When the measurement object rotates



When there are level differences on the surface of the measurement object

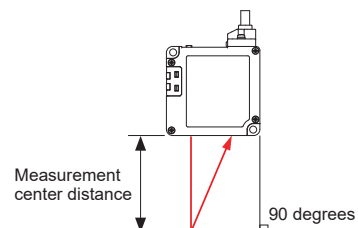


When measuring a concave part





Installation angle

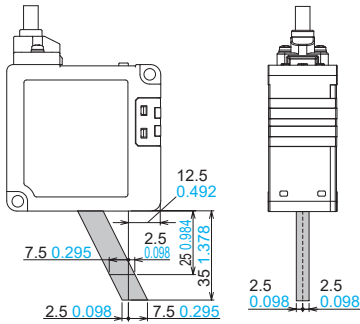
- Install the sensor so that the beam emitting part and beam receiving part surfaces are set at 90 degrees (parallel) with the measurement object.



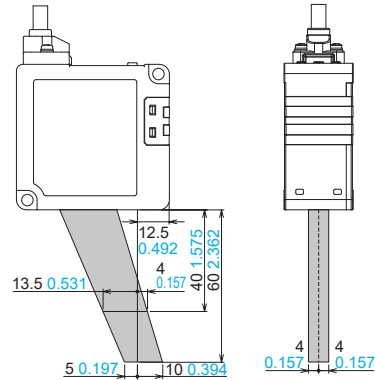
About mutual interference (Unit: mm in)

- When two or more units of this product are installed side by side, no mutual interference will occur as long as the laser spots of the other units are outside the shaded area  shown in the figure below. Install the product so that the laser spots of other products do not fall within the range of the shaded area .

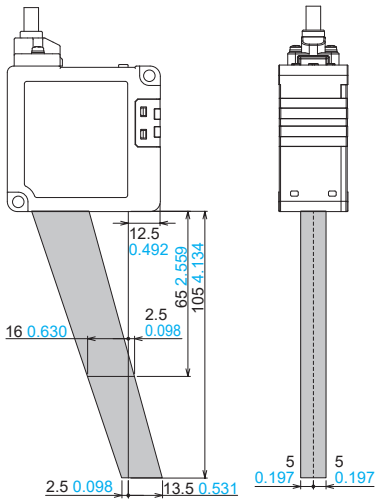
HL-G203B-S-MK HL-G203B-A-MK



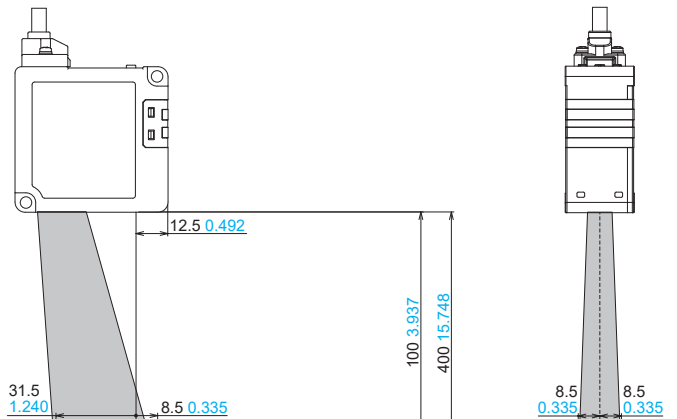
HL-G205B-S-MK HL-G205B-A-MK



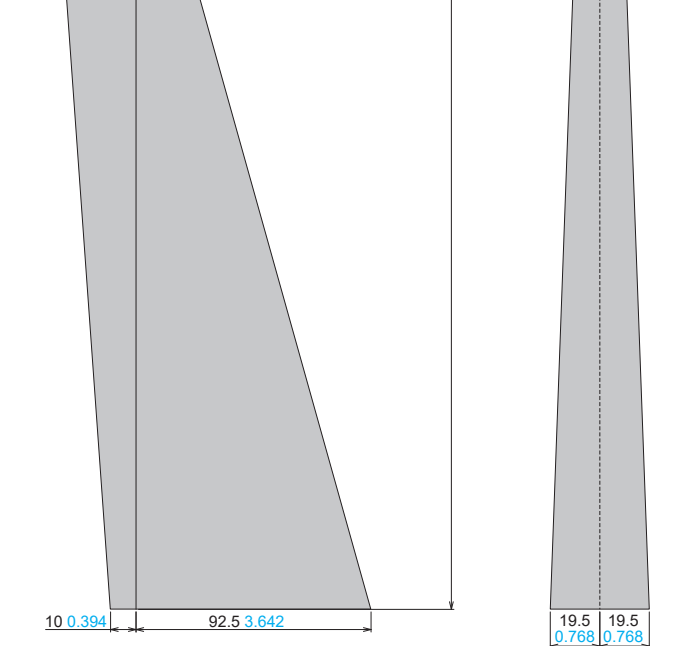
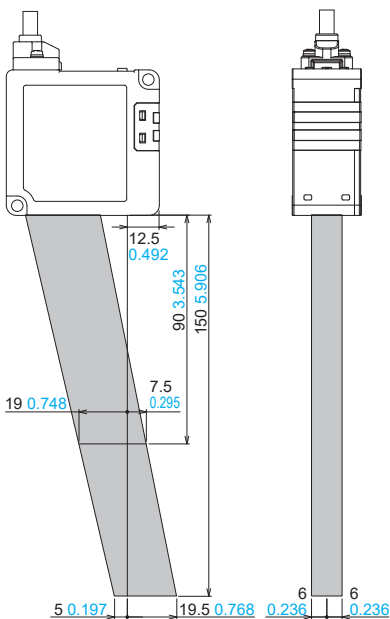
HL-G208B-S-MK HL-G208B-A-MK



HL-G225B-S-MK HL-G225B-A-MK

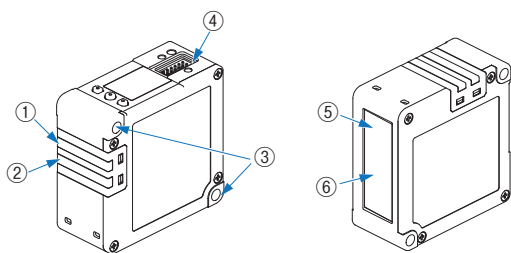


HL-G212B-S-MK HL-G212B-A-MK

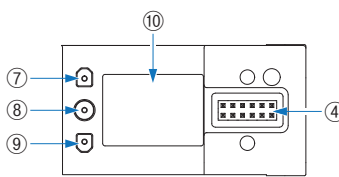


Description of parts

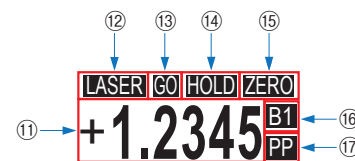
Sensor unit



Operation / display section



<Detailed view of display section>



No.	Item	Description
①	Laser radiation indicator (green)	Lit in green while laser beams are being emitted. It blinks if an error occurs.
②	Alarm indicator (orange)	Lit in orange when a measurement alarm occurs. It blinks if an error occurs.
③	Mounting hole	Used for installing the sensor unit to equipment using M4 screws with captive washers (length: 30 mm 1.181 in or longer) (not provided with the product).
④	Cable connector part	Used when connecting the sensor with a optional cable.
⑤	Beam emitting part	This part emits laser beam.
⑥	Beam receiving part	This part receives the beam reflected on the measurement object.
⑦	UP (DOWN) key	Used to change setting items and settings when configuring settings.
⑧	ENTER key	
⑨	DOWN (UP) key	
⑩	Display section	Displays measured values, settings, and error codes.
⑪	Measurement value display	The current measured value (mm) is displayed with a sign.
⑫	LASER icon	Displayed when the laser is turned ON.
⑬	HI / GO / LO icons	Displayed depending on the state of the measured value judgment result. When the measured value exceeds the HIGH set value, "HI" is displayed. When the measured value falls below the LOW set value, "LO" is displayed. When the measured value is within the range of the HIGH set value / LOW set value, "GO" is displayed.
⑭	HOLD icon	Displayed when the laser is on hold.
⑮	ZERO set icon	Displayed when zero set is turned ON.
⑯	Bank icons	The number of currently used bank (B1 to B4) is displayed.
⑰	Hold mode icons	The currently selected hold mode is displayed. • Peak Hold: P • Bottom Hold: B • Peak-to-Peak Hold: PP No icon is displayed when "None (Normal mode)" is set.

Error code display

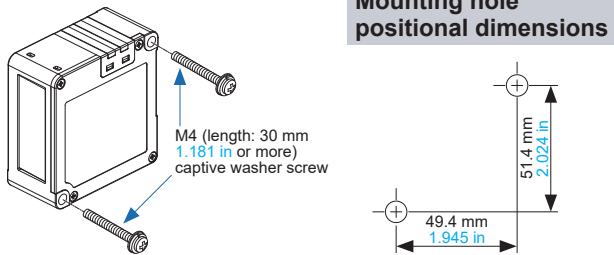
If an error occurs during setting or measurement, one of the error codes listed below will be displayed on the display section.

Error code	Description	Action method
E100**	Dark level adjustment error	Install the sensor so that strong light or fluctuating light does not enter the sensor, and turn the power OFF and then ON.
E110**	Communication start processing error (Communication type only)	Turn the power OFF and then ON.
E120**	CPU error	
E130**	Internal memory access error (system area)	
E131**	Internal memory access error (user area)	Perform the initialization of settings by following the instructions in the section, "Setting Initialization," in the instruction manual.
E140**	Internal access error	Turn the power OFF and then ON.
E150**	Start processing error	
E200**	Beam-emitting circuit error	We recommend that the sensor be replaced.
E211** E212** E213**	Overcurrent detection error (Analog output type only)	Turn OFF the power and check the load.

Note: Internal information is set in the last two digits ("**") of each error code.

Sensor installation

- Use M4 screws with captive washers (length: 30 mm 1.181 in or longer) (not provided with product) for the installation of the product. The tightening torque should be 0.8 N·m or less.

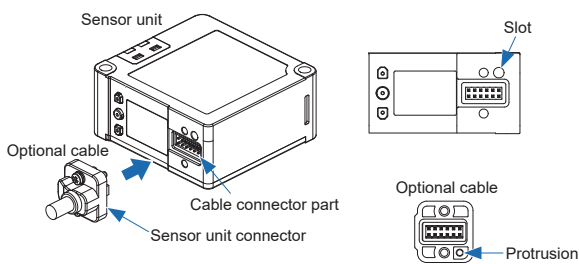


- To prevent the sensor from falling due to screw loosening, take preventive measures such as using captive washer screws depending on the usage environment.
- Install the sensor so that the beam emitting part and beam receiving part surfaces are set in parallel with the measurement object.
- If there are objects with high reflectance around the detection point, the product may be affected by ambient leakage light.
- Specular reflection of light may prevent normal measurement if it enters the beam receiving part. Be careful when installing the product if the reflectance of the sensing objects is high.
- Install this product on a surface with good heat dissipation as the product itself also generates heat. If used at an ambient temperature of 40 °C 104 °F or more, the product should be installed on an aluminum or steel surface with a surface area of 200 cm² or more.
- When installing two or more of this product in parallel, provide a clearance of 20 mm 0.787 in or more between the products, and install each one on an aluminum or steel surface with an area of 200 cm² or more at the temperature of 40 °C 104 °F or less.

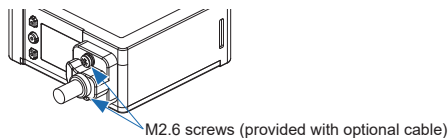
Connection / disconnection of optional cable

Connecting method

- Insert the sensor unit connection connector on the optional cable into the sensor unit cable connector.
- When doing this, insert the protrusions on the sensor unit connector on the optional cable into the slot on the connector for the sensor unit connection cable.



- Use two M2.6 screws (provided with optional cable) to secure the connector of the cable firmly in place. The tightening torque should be between 0.23 and 0.3 N·m.



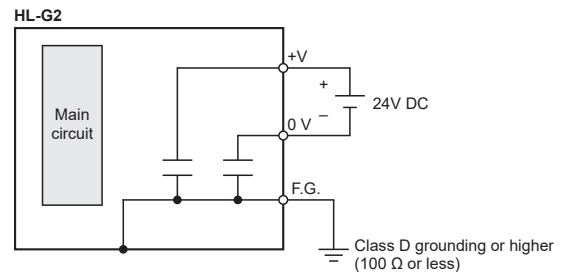
- Carefully handle the sensor so that no force is applied around the connector of the optional cable. Do not bend the cable close to the connector. Doing so may cause disconnection.
- Do not bend the optional cable to a radius of 50 mm 1.969 in or less.

Disconnecting method

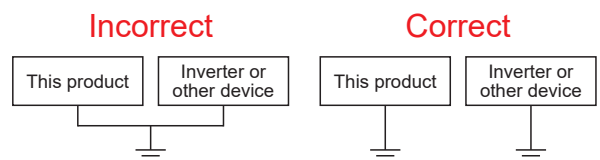
- When removing the connecting cable from the sensor, loosen the two M2.6 screws, hold the connector part of the cable, and pull out the cable.

Grounding

- The power supply (+V, 0 V) and F.G. terminals of this product are isolated by capacitors.
- The F.G. terminal and metal housing of this product are internally connected. To prevent electric shock and malfunction due to noise, use dedicated grounding with a resistance of 100 Ω or less (Class D or higher) and avoid common grounding with other devices.
- The point of grounding should be as close to this product as possible. The ground wire should be as short as possible.



* Use dedicated grounding.



Precautions for positive ground environment

Communication type

- The 0 V and SG terminals of this product are internally connected. In addition, the F.G. terminal and Ethernet shield of this product and the RJ45 connector shell are internally connected. Connecting the product to a PC or other device in which the F.G. and GND terminals are internally connected may cause a short circuit in the power supply (24 V DC) via the PC, SG terminal, or Ethernet shield, resulting in a failure. Note the following wiring precautions when using the product in a positive ground environment.
- Do not ground the F.G. of a PC or other device in which the F.G. and GND terminals are internally connected. The internal connection state varies depending on the device. For details, refer to the instruction manual of the device that you use.
- Do not ground the +V terminal of this product.
- To connect the power supply (24 V DC) for the connected device to the positive ground, prepare a separate power supply (24 V DC) for this product and insulate this product. Also, connect input lines other than for Ethernet and the RS-485 line (including the SG terminal) to a connected device with insulated I/O.

Analog output type

- The 0 V and analog GND terminals of this product are internally connected. Connecting the product to a PC or other device in which the F.G. and GND are internally connected may cause a short circuit in the power supply (24 V DC) through the PC or analog GND, resulting in a failure. Note the following wiring precautions when using the product in a positive ground environment.
- Do not ground the F.G. of a PC or other device in which the F.G. and GND terminals are internally connected. The internal connection state varies depending on the device. For details, refer to the instruction manual of the device that you use.
- Do not ground the +V terminal of this product.
- To connect the power supply (24 V DC) for the connected device to the positive ground, prepare a separate power supply (24 V DC) for this product and insulate this product. Also, connect the I/O lines and analog output lines (including the analog GND) to the connected device with insulated I/O.

Conditions for Compliance with CE Marking / UKCA Marking

- To use this product as a CE marking / UKCA marking compliant product, the following conditions must be met.
 - The signal and power lines connected to the product must not exceed the maximum length of the optional cable available.
 - For Ethernet communication: **CN-8E-C5** (Cable length: 5 m 16.404 ft)
 - For RS-485 communication: **CN-8R-C20** (Cable length: 20 m 65.617 ft)
 - For analog output type: **CN-8A-C5** (Cable length: 5 m 16.404 ft)
- If compliance with CE marking is required, SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) power supply units that comply with the EMC Directive must be used.
- If compliance with UKCA marking is required, SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) power supply units that comply with the EMC Regulations must be used.

Others

- This product has been developed / produced for industrial use only.
- This product is suitable for indoor use only.
- Do not use this product outside the scope of the specifications. Doing so may result in accidents or failures. It will also significantly shorten the service life.
- Note that, if this product is used for many hours, the brightness of the display section drops over time due to aging.
- Verify that the supply voltage fluctuations are within the rating when using the product. Applying a voltage greater than the rated voltage or directly applying AC power will result in damage or burning.
- To ensure performance, use the product at least 30 minutes (warm-up time) after the power is turned ON.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- Make sure that the power supply input satisfies the following items.
 - The power supply unit must be certified for use in your region.
 - The output holding time of the power supply unit must be 20 ms or more.
 - The current capacity (recommended current capacity including starting current, external output current, and analog output current) of the power supply unit must be 500 mA or more, including a rated output voltage of 24 V DC $\pm 10\%$ and a ripple of 0.5 V (P-P).
- Before wiring work, always turn the power OFF.
- Do not wire in parallel with a high-voltage line or power line, or run through the same conduit. Doing so may result in malfunctioning due to induction.
- Install this product on a surface with good heat dissipation as the product itself also generates heat. If used at an ambient temperature of 40 °C 104 °F or more, the product should be installed on an aluminum or steel surface with a surface area of 200 cm² or more.
- When installing two or more of this product in parallel, provide a clearance of 20 mm 0.787 in or more between the products, and install each one on an aluminum or steel surface with an area of 200 cm² or more at the temperature of 40 °C 104 °F or less.

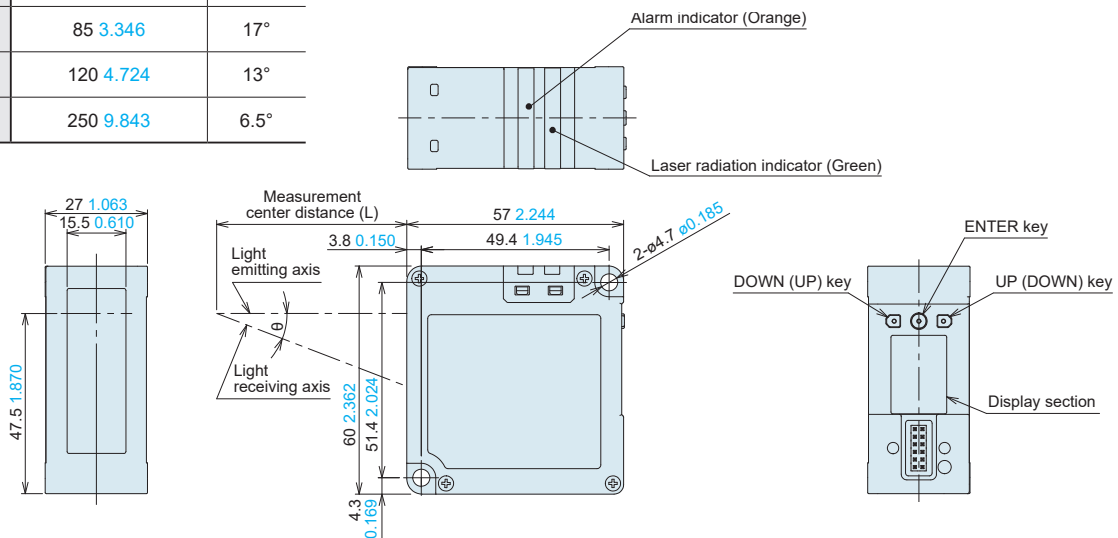
DIMENSIONS (Unit: mm in)

CAD data can be downloaded from our website

HL-G2□B-S-MK HL-G2□B-A-MK

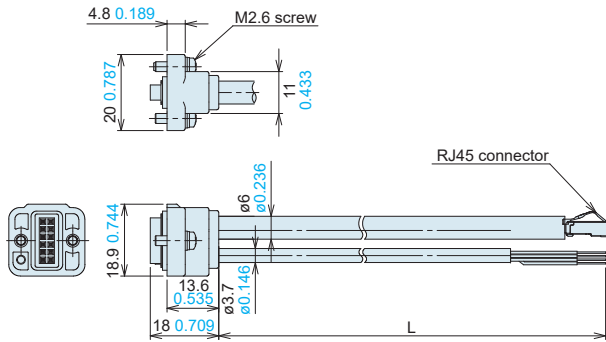
Sensor

Model No.	Measurement center distance (L)	θ
HL-G203B-S-MK HL-G203B-A-MK	30 1.181	30°
HL-G205B-S-MK HL-G205B-A-MK	50 1.969	24°
HL-G208B-S-MK HL-G208B-A-MK	85 3.346	17°
HL-G212B-S-MK HL-G212B-A-MK	120 4.724	13°
HL-G225B-S-MK HL-G225B-A-MK	250 9.843	6.5°



CN-8E-C□

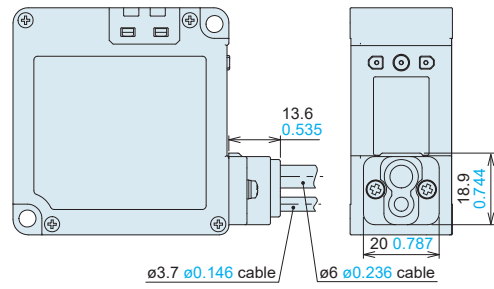
Optional Cable for Ethernet Communication (Sold Separately)



• Length L

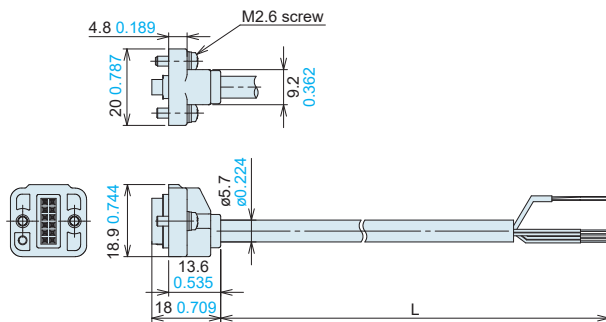
Model No.	Length L
CN-8E-C2	2,000 78.740
CN-8E-C5	5,000 196.850

Installation diagram



CN-8R-C□

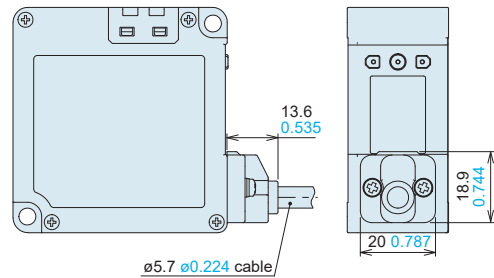
Optional Cable for RS-485 Communication (Sold Separately)



• Length L

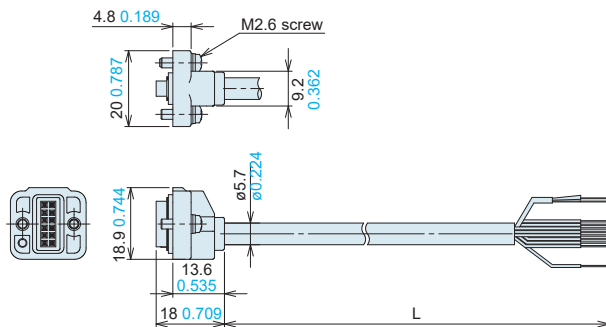
Model No.	Length L
CN-8R-C2	2,000 78.740
CN-8R-C5	5,000 196.850
CN-8R-C10	10,000 393.701
CN-8R-C20	20,000 787.402

Installation diagram



CN-8A-C□

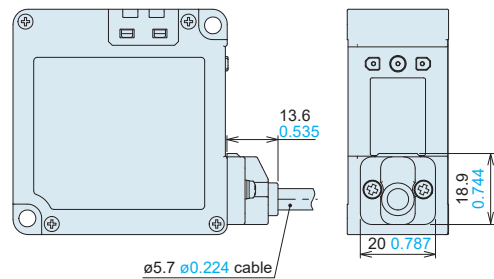
Optional Cable for Analog Output Type (Sold Separately)



• Length L

Model No.	Length L
CN-8A-C2	2,000 78.740
CN-8A-C5	5,000 196.850

Installation diagram



Disclaimer

The applications described in the catalog are all intended for examples only. The purchase of our products described in the catalog shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described applications may not infringe any intellectual property rights, such as patent rights, of a third party.

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